

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.

Appln. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

Amendments to the Claims:

Please amend claims 1, 6, 7, 12, 13, 17, 22, 23, 28 and 32-34. The following listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (Currently Amended). A liquid crystal display apparatus, comprising:

a liquid crystal element including a front substrate positioned on the side of an observer and having a first 5 electrode mounted to one surface, a rear substrate having a second electrode arranged to face said first electrode, and a liquid crystal layer interposed between ~~these~~ the front and rear substrates, said liquid crystal layer controlling ~~the~~ a polarized state of ~~the~~ transmitted light in accordance with ~~the~~ an electric 10 field applied between the first and the second electrodes;

a first reflection polarizing plate ~~arranged disposed~~ on the a front side of the liquid crystal element and reflecting ~~the~~ light of one of ~~the~~ two polarized components of ~~the~~ incident 15 light, said two polarized components being perpendicular to each other, and the first reflection polarizing plate transmitting the light of the other of the two polarized component components; and

Appln. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

a rear member arranged disposed behind the liquid crystal element and reflecting at least a part of ~~the~~ light transmitted through the liquid crystal element.

Claim 2 (Withdrawn). The liquid crystal display apparatus according to claim 1, further comprising diffusion means arranged on the front surface of said reflection polarizing plate for diffusing the light reflected from said reflection polarizing plate.

Claim 3 (Withdrawn). The liquid crystal display apparatus according to claim 1, further comprising a diffusion layer arranged between said liquid crystal element and said reflection polarizing plate arranged on the front side of said liquid crystal element and/or between said liquid crystal element and a rear member arranged on the rear side of the liquid crystal element.

Claim 4 (Withdrawn). The liquid crystal display apparatus according to claim 3, wherein said diffusion layer includes a lens film having micro lenses arranged on one surface.

Appln. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

Claim 5 (Original). The liquid crystal display apparatus according to claim 1, wherein said rear member includes at least one second reflection polarizing plate.

Claim 6 (Currently Amended). The liquid crystal display apparatus according to claim 5, wherein:

5 said liquid crystal layer element has an initial aligning state of the liquid crystal molecules which are aligned in a twist-alignment with a twisting angle of about 90°;

10 said first reflection polarizing plate is arranged disposed such that the a transmission axis thereof is substantially parallel or substantially perpendicular to the initial aligning direction state of the liquid crystal molecules in the vicinity of the front substrate of said liquid crystal element; and

said at least one second reflection polarizing plate is arranged disposed such that the a transmission axis thereof is substantially parallel or substantially perpendicular to the transmission axis of said first reflection polarizing plate.

Claim 7 (Currently Amended). The liquid crystal display apparatus according to claim 5, further comprising a back light

Appn. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

arranged disposed on the a rear side of said rear member for emitting an illuminating light.

Claim 8 (Withdrawn). The liquid crystal display apparatus according to claim 1, wherein said rear member comprises a second reflection polarizing plate that reflects the light one of the two polarized components, which are perpendicular to each other, 5 of the incident light and transmits the light of the other polarized component, and light absorption means arranged on the rear side of said second reflection polarizing plate.

Claim 9 (Withdrawn). The liquid crystal display apparatus according to claim 8, wherein said light absorbing means has a light absorbing film.

Claim 10 (Withdrawn). The liquid crystal display apparatus according to claim 8, wherein said light absorption means has an absorption polarizing plate that absorbs the light of one of the two polarized components, which are perpendicular to each other, 5 of the incident light, and transmits the light of the other polarized component.

Appn. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 26, 2003

Claim 11 (Withdrawn). The liquid crystal display apparatus according to claim 1, wherein said rear member has an absorption polarizing plate absorbing the light of one of the two polarized components, which are perpendicular to each other, of the 5 incident light and transmitting the light of the other polarized component, and a reflection plate arranged on the rear side of the absorption polarizing plate.

Claim 12 (Currently Amended). The liquid crystal display apparatus according to claim 1, further comprising an optical element arranged disposed on the front side of said first reflection polarizing plate for permitting the light incident 5 ~~from~~ on the front side to be transmitted therethrough so as to be incident on said reflection polarizing plate and also permitting the light of ~~said~~ the one polarized component reflected from said reflection polarizing plate to be incident again on said reflection polarizing plate with the polarized state changed.

Claim 13 (Currently Amended). The liquid crystal display apparatus according to claim 12, wherein said optical element ~~has~~ comprises a transparent film transmitting the incident light from the front side to be incident on the first reflection polarizing 5 plate and subjecting the light reflected from said reflection

Appln. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 26, 2003

polarizing plate to the inner surface reflection so as to permit the light to be incident again on said reflection polarizing plate.

Claim 14 (Withdrawn). The liquid crystal display apparatus according to claim 12, wherein said optical element has a retardation plate imparting a phase difference between the normal light and the abnormal light of the transmitted light so as to 5 change the polarized state of the transmitted light.

Claim 15 (Withdrawn). The liquid crystal display apparatus according to claim 14, wherein said retardation plate has a quarter wavelength plate imparting a phase difference of 1/4 wavelength between the normal light and the abnormal light of the 5 transmitted light.

Claim 16 (Withdrawn). The liquid crystal display apparatus according to claim 15, wherein said quarter wavelength plate is arranged such that the retarded phase axis thereof crosses the reflection axis and the transmission axis of the reflection 5 polarizing plate arranged on the front side of the liquid crystal element with a crossing angle of about 45°.

Appln. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

Claim 17 (Currently Amended). The liquid crystal display apparatus according to claim 12, wherein a surface treatment is applied to the front surface of said first reflection polarizing plate to permit the light of the one polarized component to be 5 incident on the optical element arranged on the front side of the reflection polarizing plate at an angle of incidence at which the light is subjected to ~~the~~ inner surface reflection by the optical element.

Claim 18 (Withdrawn). The liquid crystal display apparatus according to claim 12, wherein a surface treatment is applied to the front surface of said first reflection polarizing plate to permit the light of one polarized component to be diffused and to 5 permit the light of the other polarized component to be transmitted without being diffused.

Claim 19 (Withdrawn). The liquid crystal display apparatus according to claim 12, further comprising a diffusion layer arranged between the first reflection polarizing plate and the optical element arranged on the front side of the reflection 5 polarizing plate so as to diffuse the transmitted light within a predetermined expanding angular range.

Appln. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

Claim 20 (Withdrawn). The liquid crystal display apparatus according to claim 19, wherein said diffusion layer has a directivity in a direction inclined from a line normal to the first reflection polarizing plate.

Claim 21 (Withdrawn). The liquid crystal display apparatus according to claim 12, further comprising diffusing means arranged between the liquid crystal element and the first reflection polarizing plate arranged on the front side of the 5 liquid crystal element for diffusing the transmitted light.

Claim 22 (Currently Amended). The liquid crystal display apparatus according to claim 12, wherein said rear member includes a second reflection polarizing plate reflecting the light of one of the two polarized components, which are 5 perpendicular to each other, of the incident light and transmitting the light of the other of the two polarized component components.

Claim 23 (Currently Amended). The liquid crystal display apparatus according to claim 22, further comprising a back light arranged on the rear side of said rear member, the back light

Appln. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

transmitting the incident light from the front side, and emitting
5 an illuminating light toward the front side.

Claim 24 (Withdrawn). The liquid crystal display apparatus according to claim 12, wherein said rear member has means for reflecting the light of one of the two polarized components, 10 which are perpendicular to each other, of the incident light and absorbing the light of the other polarized component.

Claim 25 (Withdrawn). The liquid crystal display apparatus according to claim 24, wherein said rear member comprises a second reflection polarizing plate reflecting the light of one of the two polarized components, which are perpendicular to each 5 other, of the incident light and transmitting the light of the other polarized component, and light absorption means arranged on the rear side of said second reflection polarizing plate.

Claim 26 (Withdrawn). The liquid crystal display apparatus according to claim 25, wherein said light absorption means has an absorption polarizing plate transmitting the light of one of the two polarized components, which are perpendicular to each other, 5 of the incident light and absorbing the light of the other polarized component.

Appn. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

Claim 27 (Withdrawn). The liquid crystal display apparatus according to claim 25, wherein said light absorption means has a colored film absorbing the light having a predetermined wavelength band.

Claim 28 (Currently Amended). The liquid crystal display apparatus according to claim 12, wherein said rear member ~~has~~ comprises a reflection film.

Claim 29 (Withdrawn). The liquid crystal display apparatus according to claim 12, wherein said rear member has an absorption polarizing plate transmitting the light of one of the two polarized components, which are perpendicular to each other, of 5 the incident light and absorbing the light of the other polarized component, and a reflection plate arranged on the rear side of the absorption polarizing plate.

Claim 30 (Withdrawn). The liquid crystal display apparatus according to claim 29, wherein said rear member has a back light arranged between said absorption polarizing plate and said reflection means, transmitting the incident light from the front

Appln. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 30, 2003

5 side and the reflected light from the reflection film, and emitting an illuminating light toward the front side.

Claim 31 (Withdrawn). The liquid crystal display apparatus according to claim 12, wherein said rear member has a second reflection polarizing plate arranged on the rear side of the liquid crystal element, a third reflection polarizing plate arranged on the rear side of said second reflection polarizing plate, a diffusion layer arranged between said second and third reflection polarizing plates and diffusing the transmitted light, and light absorbing means arranged on the rear side of said third reflection polarizing plate.

Claim 32 (Currently Amended). The liquid crystal display apparatus according to claim 12, further comprising diffusion means arranged disposed between the liquid crystal element and said rear member for diffusing the transmitted light.

Claim 33 (Currently Amended). The liquid crystal display apparatus according to claim 32, wherein said diffusion means has a directivity in a direction parallel to a line normal to the reflection polarizing plate arranged disposed on the front side 5 of the liquid crystal element.

Appln. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

Claim 34 (Currently Amended). The liquid crystal display apparatus according to claim 33, wherein said diffusion means includes comprises a lens film having micro lenses arranged disposed on one surface.

Claim 35 (Withdrawn). The liquid crystal display apparatus according to claim 12, wherein said rear member has diffusion-reflection properties.

Claim 36 (Original). The liquid crystal display apparatus according to claim 12, wherein said liquid crystal element is a simple matrix liquid crystal element in which liquid crystal molecules are twist-aligned with a twisting angle of about 100°.

Claim 37 (Original). The liquid crystal display apparatus according to claim 36, wherein said liquid crystal element has a liquid crystal layer in which the product Δn between the refractive index anisotropy Δn of the liquid crystal and the thickness d of the liquid crystal layer falls within a range of between 115 nm and 130 nm.

Appln. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

Claim 38 (Withdrawn). The liquid crystal display apparatus according to claim 1, wherein said liquid crystal element has a liquid crystal layer in which liquid crystal molecules are twist-aligned with a twisting angle of 180° to 270° between the 5 front and rear substrates.

Claim 39 (Withdrawn). The liquid crystal display apparatus according to claim 38, further comprising a transparent film arranged on the front side of said first reflection polarizing plate for subjecting the light reflected from the first 5 reflection polarizing film to the inner surface reflection so as to be incident again on said reflection polarizing plate.

Claim 40 (Withdrawn). The liquid crystal display apparatus according to claim 38, wherein said transparent film exhibits optical characteristics of changing the polarized state of the transmitted light.

Claim 41 (Withdrawn). The liquid crystal display apparatus according to claim 40, wherein said transparent film includes a quarter wavelength plate imparting a phase difference of 1/4 wavelength between the normal light and the abnormal light of the 5 transmitted light.

Appln. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

Claim 42 (Withdrawn). The liquid crystal display apparatus according to claim 41, wherein said quarter wavelength plate is arranged such that the retarded phase axis thereof crosses the transmission axis of the reflection polarizing plate arranged on 5 the front side of the liquid crystal element with a crossing angle of about 45°.

Claim 43 (Withdrawn). The liquid crystal display apparatus according to claim 40, further comprising diffusion means arranged on the front side of the first reflection polarizing plate for diffusing the light reflected from the reflection 5 polarizing plate.

Claim 44 (Withdrawn). The liquid crystal display apparatus according to claim 38, further comprising an absorption polarizing plate arranged between the liquid crystal element and the first reflection polarizing plate such that the transmission 5 axis of said absorption polarizing plate is substantially parallel to the transmission axis of the reflection polarizing plate, and having a transmission axis transmitting one of the two polarized components, which are perpendicular to each other, of

Appn. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 20, 2003

the incident light and an absorption axis absorbing the light of
10 the other polarized component.

Claim 45 (Withdrawn). The liquid crystal display apparatus
according to claim 38, further comprising a diffusion layer
arranged between the liquid crystal element and the first
reflection polarizing plate and/or between the liquid crystal
5 element and the reflection means arranged on the rear side of the
liquid crystal element.

Claim 46 (Withdrawn). The liquia crystal display apparatus
according to claim 38, wherein said rear member includes a second
reflection polarizing plate reflecting the light of one of two
polarized components, which are perpendicular to each other, of
5 the incident light and transmitting the light of the other
polarized component.

Claim 47 (Withdrawn). The liquid crystal display apparatus
according to claim 38, wherein said rear member includes an
absorption polarizing plate absorbing the light of one of two
polarized components, which are perpendicular to each other, of
5 the incident light and transmitting the light of the other
polarized component.

Appln. No. 09/669,946
Amendment dated January 19, 2004
Reply to Office Action of October 30, 2003

Claim 48 (Withdrawn). The liquid crystal display apparatus according to claim 38, wherein said rear member includes a reflection film.